REMARKS

The Official Action mailed August 23, 2002 has been received and its contents carefully noted. This response is filed within three months of the mailing date of the Official Action and therefore is believed to be timely without extension of time.

The Applicants note with appreciation the consideration of the Information Disclosure Statements filed on January 31, 2001; September 10, 2001; October 15, 2001; February 14, 2002; February 25, 2002; and May 1, 2002. A further Information Disclosure Statement is submitted herewith and careful review and consideration of this Information Disclosure Statement is requested.

Claims 2-23 are pending in the present application, of which claims 2-7 are independent. Claims 2-7 have been amended herewith and for the reasons set forth in detail below, all claims are believed to be in condition for allowance.

The present invention relates to a semiconductor device having a TFT. Specifically, the present invention relates to a TFT having a channel formation region, a source region and a drain region, wherein the channel formation region comprises an element selected from group IV elements other than silicon, and wherein a plurality of crystalline grains are extending in a same direction (claims 2, 6 and 7); in parallel with a plane that is in parallel with the source region, the drain region and the channel formation region (claims 3 and 4); or in a direction connecting the source region and the drain region (claim 5).

Paragraph 3 of the Official Action rejects claims 2 and 3 as anticipated by U.S. Patent No. 5,422,302 to Yonehara. The Applicants respectfully traverse the rejection. Yonehara '302 does not teach or suggest all the elements of the independent claims, either explicitly or inherently. The Official Action asserts that Yonehara '302 teaches that a channel formation region 1713 "comprises a plurality of crystal provided in said crystalline semiconductor and extending in a same direction." However, the Official Action has not provided any citation from the Yonehara '302 reference to support this assertion. Furthermore, Yonehara '302 appears in fact to teach away from the teaching of the present invention that a plurality of crystal grains are provided in said crystalline semiconductor and are extending in a same direction. Yonehara '302 recites that "the crystal direction within the substrate plane is not constant" (col. 4, lines 41-43; col. 7,

lines 44-45), and "the crystal direction within the substrate plane in amorphous substrate is not determined" (col. 7, lines 38-40). With respect to claim 3, Yonehara '302 also does not teach that a plurality of crystal grains are in parallel with a plane which is in parallel with the source region, the drain region and the channel formation region. Since Yonehara '302 does not teach or suggest all the elements of the independent claims, either explicitly or inherently, an anticipation rejection cannot be maintained.

For the reasons stated above, the Official Action has not formed a proper anticipation rejection. Accordingly, reconsideration and withdrawal of the rejection of independent claims 2 and 3 under 35 U.S.C. § 102(e) is in order and respectfully requested.

Paragraph 5 of the Official Action rejects claims 4-7, 12, 15, 18 and 21 as anticipated by European Patent No. 0390 608 to Yonehara. The Applicants respectfully traverse the rejection. Yonehara '608 does not teach or suggest all the elements of the independent claims, either explicitly or inherently. The Official Action asserts that Yonehara '608 teaches that a plurality of crystals are in parallel with a plane in parallel with which a source region, a drain region and a channel formation region are arranged, or an intersecting angle between a direction in parallel with crystals and a direction connecting said source region and said drain region is adjusted in order to control resistance against movement of carriers in said channel formation region. The Official Action has not provided a single citation from the Yonehara '608 reference to support this assertion. The Official Action merely recites the features of the claims of the Applicants' present invention. At best, Yonehara '608 teaches that "the position of the grain boundaries may be controlled by controlling the nucleus forming site" (p. 5, lines 25-26). While the position of the grain boundaries is discussed in Yonehara '608, the direction of the grain boundaries is not. Yonehara '608 does not teach or suggest a plurality of crystalline grains extending in a same direction (claims 6 and 7); in parallel with a plane which is in parallel with the source region, the drain region and the channel formation region (claim 4); or in a direction connecting the source region and the drain region (claim 5). Since Yonehara '608 does not teach or suggest all the elements of the

independent claims, either explicitly or inherently, an anticipation rejection cannot be maintained.

For the reasons stated above, the Official Action has not formed a proper anticipation rejection. Accordingly, reconsideration and withdrawal of the rejection of independent claims 4-7 under 35 U.S.C. § 102(a) is in order and respectfully requested. Likewise, it is believed that dependent claims 12, 15, 18 and 21 are allowable in that they depend from what is believed to be allowable base claims 4-7.

Paragraph 9 of the Official Action rejects claims 8 and 10 as obvious based on the combination of Yonehara '302 and '608. The Applicants respectfully submit that a *prima facie* case of obviousness cannot be maintained against the dependent claims of the present invention.

As stated in MPEP §§ 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The prior art, either alone or in combination, does not teach or suggest all the features of the claims. Please incorporate the arguments above with respect to the deficiencies in Yonehara '302 and '608. Yonehara '302 and '608, either alone or in combination, do not teach or suggest a plurality of crystalline grains extending in a

same direction; in parallel with a plane which is in parallel with the source region, the drain region and the channel formation region; or in a direction connecting the source region and the drain region. Since Yonehara '302 and '608 do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Reconsideration is requested.

Paragraph 11 of the Official Action rejects claims 9, 11, 14, 16, 17, 20 and 23 as obvious based on the combination of Yonehara '302 , Yonehara '608, and U.S. Patent No. 5,294,560 to Ono et al. Paragraph 13 of the Official Action rejects claims 13, 16, 19 and 22 as obvious based on the combination of Yonehara '302, Yonehara '608 and U.S. Patent No. 4,740,829 to Nakagiri et al.

The prior art, either alone or in combination, does not teach or suggest all the features of the claims. Please incorporate the arguments above with respect to the deficiencies in Yonehara '302 and '608. Ono and Nakagiri do not cure the deficiencies in Yonehara '302 and '608. Ono is relied upon to teach an active matrix display, and Nakagiri is relied upon to teach the measurement of concentration using SIMS. Yonehara '302, Yonehara '608, Ono and Nakagiri, either alone or in combination, do not teach or suggest a plurality of crystalline grains extending in a same direction; in parallel with a plane which is in parallel with the source region, the drain region and the channel formation region; or in a direction connecting the source region and the drain region. Since Yonehara '302, Yonehara '608, Ono and Nakagiri do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained.

For the reasons stated above, the Official Action has not formed a proper *prima facie* case of obviousness. Accordingly, reconsideration and withdrawal of the rejection of dependent claims 9, 11, 13, 14, 16, 17, 19, 20, 22 and 23 under 35 U.S.C. § 103(a) is in order and respectfully requested.

Paragraph 15 of the Official Action rejects claims 4-7 and 12-23 under the doctrine of obviousness-type double patenting over claims 1-26 of U.S. Patent No. 6,160,279 to Zhang et al. The Applicants respectfully request that this rejection be held in abeyance at this time until allowable subject matter is indicated.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claims 2-7 as follows:

2. (Amended) A semiconductor device comprising:

a source region and a drain region;

a channel formation region provided between said source region and said drain region and provided in a crystalline semiconductor comprising silicon;

wherein said channel formation region [contains] comprises an element selected from group IV elements other than silicon, and

wherein said channel formation region comprises a plurality of [crystals] crystal grains provided in said crystalline semiconductor and extending in a same direction.

3. (Amended) A semiconductor device comprising:

a source region and a drain region;

a channel formation region provided between said source region and said drain region and provided in a crystalline semiconductor comprising silicon;

wherein said channel formation region [contains] comprises an element selected from group IV elements other than silicon, and

wherein said source region, said drain region and said channel formation region are arranged in parallel with a plane,

wherein said channel formation region comprises a plurality of [crystals] crystal grains provided in said crystalline semiconductor, and

wherein said plurality of [crystals] crystal grains are in parallel with said plane in parallel with which said source region, said drain region and said channel formation region are arranged.

4. (Amended) A semiconductor device comprising:

a source region and a drain region;

a channel formation region provided between said source region and said drain region and provided in a crystalline semiconductor comprising silicon;

wherein said channel formation region [contains] comprises an element selected from group IV elements other than silicon, and

wherein said source region, said drain region and said channel formation region are arranged in parallel with a plane,

wherein said channel formation region comprises a plurality of [crystals] crystal grains provided in said crystalline semiconductor,

wherein said plurality of [crystals] crystal grains are in parallel with said plane in parallel with which said source region, said drain region and said channel formation region are arranged, and

wherein concentration of said element in said channel formation region is 5×10^{19} atoms/cm^3 or less.

5. (Amended) A semiconductor device comprising:

a source region and a drain region;

a channel formation region provided between said source region and said drain region and provided in a crystalline semiconductor comprising silicon;

wherein said channel formation region [contains] comprises an element selected from group IV elements other than silicon,

wherein said channel formation region comprises a plurality of [crystals] crystal grains provided in said crystalline semiconductor and extending in a direction connecting said source region and said drain region, and

wherein concentration of said element in said channel formation region is 5×10^{19} atoms/cm^3 or less.

6. (Amended) A semiconductor device comprising:

a source region and a drain region;

a channel formation region provided between said source region and said drain region and provided in a crystalline semiconductor comprising silicon;

wherein said channel formation region [contains] comprises an element selected from group IV elements other than silicon,

wherein said channel formation region comprises a plurality of [crystals] crystal grains provided in said crystalline semiconductor and extending in a same direction,

wherein an intersecting angle between said same direction and a direction connecting said source region and said drain region is adjusted in order to control resistance against movement of carriers in said channel formation region, and

wherein concentration of said element in said channel formation region is 5×10^{19} atoms/cm^3 or less.

7. (Amended) A semiconductor device comprising:

a source region and a drain region;

a channel formation region provided between said source region and said drain region and provided in a crystalline semiconductor comprising silicon;

wherein said channel formation region [contains] comprises an element selected from group IV elements other than silicon,

wherein said channel formation region comprises a plurality of [crystals] crystal grains provided in said crystalline semiconductor and extending in a same direction,

wherein an intersecting angle between said same direction and a direction connecting said source region and said drain region is adjusted in order to control a rate at which carriers traverse grain boundaries in said channel formation region, and

wherein concentration of said element in said channel formation region is 5×10^{19} atoms/cm^3 or less.